

**Facilities Study Report**

**For**

**Physical Interconnection of**

**PJM Generation Interconnection Request**

**Project ID AG1-285**

**Chase City-Central 115 kV**

Revision 2: September 2025

Revision 1: July 2025

Revision 0: November 2024

## Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff, as well as the Application and Studies Agreement between the Project Developer and PJM Interconnection, LLC (PJM or Transmission Provider (TP)). The Transmission Owner (TO) is Virginia Electric and Power Company (VEPCO or Dominion).

### A. Transmission Owner Facilities Study Summary

#### 1. PROJECT DESCRIPTION

The Project Developer (PD) has proposed a Solar Generating Facility located in Charlotte, VA with a designated PJM Project ID of AG1-285. The installed facilities will have a total Maximum Facility Output (MFO) of 125 MW with 75 MW of this output being recognized by PJM as Capacity.

#### 2. POINT OF INTERCONNECTION (POI)

AG1-285 is a new service request project that will interconnect with the Dominion transmission system via a newly constructed 115kV/230 kV Substation.

AG1-285 will tap into the 115kV side of the 115kV/230kV Substation. Network upgrade n9630 will construct a new 230 kV line from AG1-285 Substation to Finneywood Substation. The construction of the new interconnection substation will result in the splitting of the existing 115kV 1012 circuit into two lines on the transmission system. The new line numbers will be determined during the detailed engineering phase of the project.

The proposed generation interconnection is shown on the single line diagram in Attachment #1.

#### 3. POINT OF CHANGE IN OWNERSHIP

The Point in Change of Ownership will be the 115kV disconnect switch 4-hole pad inside the Dominion station by the common fence.

#### 4. SCOPE OF PROJECT DEVELOPER INTERCONNECTION FACILITIES

Project Developer will design, build, own, operate and maintain the Project Developer Interconnection Facilities on Project Developer's side of the Point of Change in Ownership (PCO). This includes, but is not limited to:

- Main Power Transformer (s) (MPT), Generation step-up (GSU) transformer(s) or final transformation, as applicable.
- Circuit breakers and associated equipment located between the high side of the MPT(s) or GSU(s) and the Point of Change in Ownership.
- Generator lead line from the Generating Facility to the Point of Change in Ownership.
- Relay and protective equipment, telecommunications equipment, and Supervisory Control and Data Acquisition (SCADA) to comply with the TO's Applicable Technical Requirements and Standards.

## **B. Transmission Owner Facilities Study Results**

The following is a description of the planned Transmission Owner facilities for the physical interconnection of the proposed AG1-285 project to the Dominion transmission system. These facilities shall be designed according to Dominion Applicable Technical Requirements and Standards. Once built, Dominion will own, operate, and maintain these Facilities.

### **1. TRANSMISSION OWNER INTERCONNECTION FACILITIES:**

The Transmission Owner Interconnection Facilities will include, but not be limited to, the following:

The Point of Change in Ownership between the two stations will be the 115kV disconnect switch 4-hole pad inside the Dominion station by the common fence.

#### **Purchase and install substation material – Transmission Owner Interconnection Facilities Upgrade:**

1. One (1), 115kV, 2000A, 3-phase vertical mounted switch (by Transmission)
2. Three (3), 115kV, metering accuracy CCVT
3. Three (3), 115kV, 500:5 metering accuracy CT
4. Conductor, connectors, conduits, control cables, foundations, steel structures and grounding material as per engineering standards

#### **Purchase and install relay material – Transmission Owner Interconnection Facilities Upgrade:**

1. One (1), 1340 – 24" dual SEL-411L CD/Fiber line panel
2. One (1), 1425 – 24" dual SEL-735 transmission and generator interconnect metering panel
3. One (1), 4524 – revenue metering CT make-up box
4. One (1), 4506 – 3-phase CCVT potential make-up box with metering (P4)
5. One (1), 1323 – 24" SEL-487E/735 PMU and PQ monitoring panel

With the addition of the new 230kV line associated with n9630. The AG1-285 generation interconnection will no longer be considered for an Option to Build.

### **2. STAND ALONE NETWORK UPGRADES**

The Stand Alone Network Upgrades will include, but not be limited to, the following:

None

### **3. NETWORK UPGRADES**

The Network Upgrades will include, but not be limited to, the following:

Please note, this Phase II Facility Study was generated when AG1-285 was intended to connect to a proposed new 230kV line from Chase City to Farmville. AG1-285 substation will now connect to the existing 1012 line and a new 230kV line running from AG1-285 to Finneywood. Despite referencing 230kV equipment, the following scope approximates the engineering the construction effort required to loop in existing 1012 line into AG1-285 Substation.

***For new interconnection substation:***

A new interconnection substation will be constructed adjacent to line 1012 to interconnect the project with the Dominion transmission system (N9417). To address reliability requirements, the substation will be expanded to a 115kV/230 kV configuration as shown in the one line (N9630).

The Project Developer will provide the property and access to the Substation. The grounding systems for each station will be tied together. All substation permitting, site preparation and grading activity will be performed by the Project Developer. All permits are the responsibility of the developer.

Substation design and relay protection are based on Dominion's Facility Interconnection Requirements, NERC Compliance Procedure FAC-001 (version 23), that is posted on PJM's website. This standard meets or exceeds the PJM Transmission and Substation Design Subcommittee Technical Requirements and the PJM Protection Standards (PJM Manual 7).

The scope of work includes the following:

**Purchase & install substation material – Network Upgrade:**

1. Approximate station fence line dimensions of 430' x 430'. At a minimum, site preparation and grading will be required to extend 15' beyond these dimensions for station grounding. Additional property and site prep may be required for proper grading and stormwater management, etc.
2. Approximately 1,720 linear ft of 5/8" chain link, 12 ft tall, perimeter fence around the station along with the security cameras and integrators as per design 3 fence standards
3. Two (2), 230-115kV, 224MVA, three phase transmission transformers
4. Two (2), Transformer oil containment
5. Eight (8), 115kV, 3000A, 40kAIC, SF-6 circuit breaker
6. Four (4), 230kV, 4000A, 63kAIC, SF-6 circuit breaker
7. Sixteen (16), 115kV, 3000A, 3-phase center break gang operated switch
8. Eight (8), 230kV, 4000A, 3-phase double-end break switch
9. Eight (8), 115kV, relay accuracy CCVT
10. Five (5), 230kV, relay accuracy CCVT
11. Two (2), 115kV, 2000A wave trap
12. Two (2), line tuner
13. Fifteen (15), 90kV, 74kV MCOV surge arrester
14. Nine (9) 180kV, 144kV MCOV surge arrester
15. Six (6) 18kV, 15.3kV MCOV surge arrester
16. Four (4), 167kVA, 13.2kV-120/240V, station service transformer
17. Two (2), 13.2kV, 25A-E, SMD-20 fuse link
18. Two (2), 13.2kV, 25A-K, SMD-20 fuse link
19. Four (4), 8.3kV, 40A-K, BCL fuse
20. Two (2), 115kV, heavy duty steel backbone (by Transmission)
21. One (1), 230kV, heavy duty steel backbone (by Transmission)
22. Four (4), shield wire poles and three spans of shield wire (by Transmission)
23. One (1), 24' x 70' control enclosure

24. One (1), 125 VDC, 495 Ah station battery and 2-50 Amp charger (size to be verified during detail engineering)
25. Two (2), 38" x 38" x 42" precast yard pull box
26. Approximately 370 ft of cable trough with a 40 ft road crossing section
27. Station stone as required
28. Station lighting as required
29. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports
30. Foundations as required including control house, equipment, and bus support stands
31. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per engineering standards

**Purchase & install relay material – Network Upgrade:**

1. Two (2), SPR Relay/Aux Package
2. Two (2), 4510 – SEL-2411 transformer annunciator
3. Two (2), 1217 – dual SEL-487E transmission transformer diff panel
4. Seven (7), 1110 – SEL-587/351 bus panel
5. Twelve (12), 4510 – SEL-2411 breaker annunciator
6. Eight (8), 1510 – dual SEL-351 transmission breaker panel w/ reclosing
7. Four (4), 1511 – dual SEL-351 transmission breaker panel w/o reclosing
8. One (1), 1340 – dual SEL-411L CD/Fiber line panel
9. Two (2), 1340 – dual SEL-411L DCB/PLC line panel
10. Three (3), 4506 – 3-phase CCVT potential make-up box
11. Four (4), 4507 – 1-phase CCVT potential make-up box
12. Twelve (12), 4526\_A – Circuit breaker fiber optic make-up box
13. Two (2), 4526\_C - >=84MVA transformer fiber make-up box
14. Seven (7), 4200 – Bus differential CT make-up box
15. Two (2), 4000 – station service potential make-up box
16. Two (2), 4018 – 500A station service AC distribution panel
17. Two (2), 4007 – 225A outdoor transmission yard AC NQOD
18. Two (2), 4019 – 225A 3-phase throw over switch
19. Two (2), 4016 – 600A PVT disconnect switch
20. One (1), 4153c – wall mount station battery monitor
21. One (1), 5618 – SEL-3555 communications panel
22. One (1), 1255 – station annunciator panel
23. One (1), 5021 – SEL-2411 RTU panel
24. One (1), 5609 – fiber optic management panel
25. One (1), 5202 – 26" APP 601 digital fault recorder
26. Ten (10), 4040 – security fiber/power make-up box
27. One (1), 5603 – station network panel no. 1
28. One (1), 5603 – station network panel no. 2
29. One (1), 4051 – power block
30. One (1), 4042\_D1B – security utility – utility ATS
31. One (1), 4044 – 225A 1Ø outdoor main security AC NQOD
32. Two (2), 4040 – 100A 1Ø outdoor security AC NQOD

33. One (1), 5616 – station security panel
34. One (1), 5616 – station security fence panel
35. Two (2), 4018 – 225A station service AC distribution panel branch breaker
36. One (1), high voltage protection (HVP) box (provided by IT) (to be verified during detail engineering)
37. One (1), telephone interface box (to be verified during detail engineering)

***Transmission Line Tie-in for new interconnection substation:***

This project serves to cut in to a the 115kV 1012 line, in order to interconnect a new substation called AG1-285, which is to be located in Charlotte County, VA. The line is to be cut-in between existing structures 1012/544 and 1012/546.

The proposed structures to be installed are two engineered steel single circuit 3-pole double dead-end structures, two (2) single circuit heavy duty backbone structures and two (2) steel static poles. The new conductor and shield wire to be used will be twin bundled (2) 768.2 ACSS/TW/HS (20/7) ‘Maumee’ conductor, and (2) DNO-11410 OPGW for the proposed cut-in substation.

**Existing Facilities to be Removed:**

1. Remove one (1) existing 115 kV single circuit weathering steel 2-pole H-frame suspension structure as follows:
  - a. Structure 1012/545

**Modification to Existing Facilities:**

1. Cut and transfer the 230 kV TBD conductor type from the ahead side of existing structure 1012/544 to the back side of proposed structure 1012/545.
2. Cut and transfer the 230 kV TBD conductor type from the ahead side of proposed structure 2XXX/545 to the back side of existing structure 1012/546.
3. Cut and transfer TBD shield wiring from the ahead side of existing structure 1012/544 to the back side of proposed structure 1012/545.
4. Cut and transfer TBD shield wiring from the ahead side of proposed structure 2XXX/545 to the back side of existing structure 1012/546.

**Permanent Facilities to be Installed:**

1. Install two (2) 230 kV single circuit 3-pole steel double dead-end structures on foundations as follows:
  - a. Structures 1012/545 and 2XXX/545
2. Install two (2) 230 kV single circuit heavy duty steel backbone structures on foundations as follows:

- a. Structures 1012/546 and 2XXX/544
3. Install two (2) steel static poles on foundations as follows:
  - a. Structures 2XXX/544A and 2XXX/544B
4. Install approximately 0.22 miles of 3-phase twin bundled (2) 768.2 ACSS/TW/HS (20/7) 'Maumee" 250°C conductor from proposed structure 1015/545 to proposed backbone 1012/546 and from proposed structure 2XXX/545 to proposed backbone 2XXX/544.
5. Install approximately 0.22 miles of two (2) DNO-11410 OPGW from proposed structure 1012/545 to proposed backbone 1012/546 and from proposed structure 2XXX/544 to proposed backbone 2XXX/545.
  - a. This includes the installation of eight (8) of splices as follows:
    - i. Two (2) on structures 1012/545, 1012/546, 1XXX/544 and, 1XXX/545
6. Install approximately 0.23 miles of one (1) 7#7 Alumoweld shield wire within AG1-285 Substation.

#### 4. OTHER SCOPE OF WORK

The Project Developer will supply and own metering equipment that will provide instantaneous net MW and MVar per unit values in accordance with PJM Manuals M-01 and M-14D, and Sections 8.1 through 8.5 of Appendix 2 to the GIA.

#### 5. MILESTONE SCHEDULE FOR COMPLETION OF TO WORK

Facilities outlined in this report are estimated to take 47 months to construct, from the time the Generator Interconnection Agreement is fully executed. This schedule may be impacted by the timeline for procurement and installation of long lead items, the ability to obtain outages to construct and test the proposed facilities.

Description	Start month	Finish month
Detailed Design	1	11
Permitting	3	38
Construction	37	47

#### 6. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

##### General Assumptions:

1. The estimated procurement lead time for breakers is based on current Dominion pre-ordered breaker production slots. These production slots will be assigned after the agreement is

executed.

2. The preliminary construction schedule is dependent on outage availability.
3. AG1-285 substation will connect to the existing 115kV 1012 line and the proposed 230kV line from AG1-285 to Finneywood.
4. AG1-285 115kV substation will be a breaker and a half configuration.
5. The AG1-285 estimated cost provided during transition cycle 1 phase 2 was based on the assumption the generation interconnection substation would be a 230kV 3-breaker ring configuration.
6. N9630 will absorb the scope for the AG1-285 generation interconnection facility. N9630 will also include a new 230kV substation and 230kV line connection from AG1-285 to Finneywood.

#### **TOIF/SANU Conceptual Design Notes:**

1. Additional work will be required at the remote end stations once the line information has been determined.
2. Security and fence type – design level 3.
3. Currently, the scope and estimate assume the use of Dominion standard spread footer foundations. Once the soil information is available and if it is prudent to change the design to “helical pile foundations” the Dominion team should be informed to adjust the project estimate at the earliest possible opportunity.

#### **Network Upgrades Conceptual Design Notes:**

1. Engineered steel pole costs were determined based off typical wind and weight spans, line angles, and average structure heights for each voltage.
2. Steel pole foundation costs were based off the projects’ location and structure type in the regional soil profile map. The regional soil profile map used for this project is Piedmont soil type profile.
3. Survey cost were determined based on substation proposed location, fiber installation, and impacts on existing line.
4. Once more information is obtained about the 230 kV line and configuration, further analysis will be required in detailed design.

### **7. REVENUE METERING REQUIREMENTS**

All revenue metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AG1-285 GIA, and in PJM Manuals M01 and M14D. The details of applicable revenue metering requirements are given in section 4.1.6 Metering and Telecommunications of Dominion’s Facility Interconnection Connection Requirement NERC Standard FAC-001 posted on PJM website.

The revenue metering will be installed on the Transmission Owner side of the Point of Change in Ownership will be installed, owned and maintained by Transmission Owner.



- a. Hourly compensated MWh received from the Generating Facility to the TO;
- b. Hourly compensated MVARh received from the Generating Facility to the TO;
- c. Hourly compensated MWh delivered from the TO to the Generating Facility; and
- d. Hourly compensated MVARh delivered from the TO to the Generating Facility.

The Project Developer will access revenue meter via wireless transceivers or fiber cabling to meter with RS-485 or Ethernet communication port for dial-up reads. Project Developer must provide revenue and real time data to PJM from Project Developer Market Operations Center per “PJM Telemetry Data Exchange Summary” document available at PJM.com.

## **8. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION**

Land requirements for the Interconnection Substation needed for this interconnection project must meet the requirements in Dominion’s Facility Interconnection Requirements, NERC Compliance Procedure FAC-001 (version 23), that is posted on PJM’s website.

The Project Developer would be responsible for the following expectations in the area of Real Estate.

- The land required for Dominion’s substation and project specific areas around must be deeded over title-in-fee.
- Any additional land needed for Storm Water Management, Landscaping, and Wetlands/Wetlands Mitigation.
- Dominion Real Estate and Counsel will provide standard real estate checklist word document. Process needs to start at least 6 months prior to closing date.
- Required subdivision plat and associated documentation to be reviewed prior to subdividing parcel with the county.
- Suitable Access Road from Substation to a Virginia/North Carolina State Maintained Roadway.
- Dominion will require access road, transmission line and utilities easement to the Substation.
- Any other Land/Permitting requirements required by the Substation.

## **9. ENVIRONMENTAL AND PERMITTING**

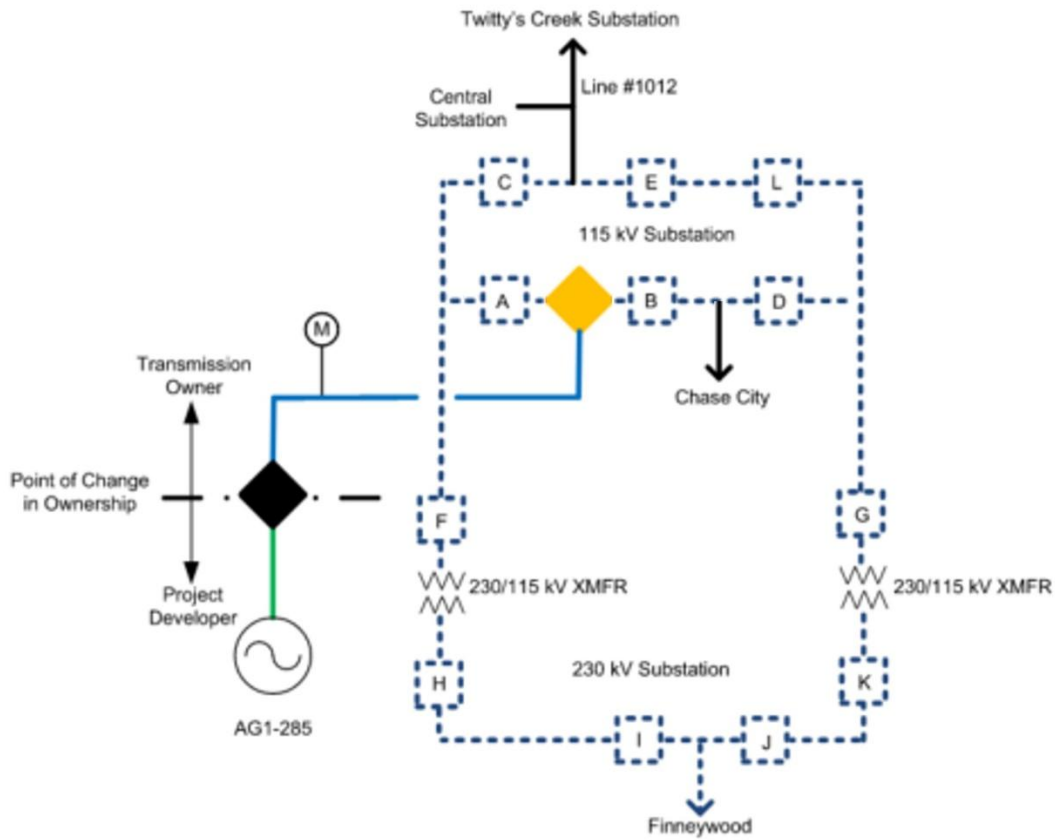
The Project Developer would be responsible for the following expectations in the area of Environmental and Permitting.

- Assessment of environmental impacts related to the Interconnection Facility and/or Network Upgrades including:
  - Environmental Impact Study requirements
  - Environmental Permitting
- Dominion will require a stormwater easement for substation specific stormwater design BMP’s to allow access to and use of the facilities.
  - A maintenance agreement should be in place in perpetuity for said stormwater facilities.

- Conditional Use Permit for Substation
- Any additional land needed for Storm Water Management, Landscaping, and Wetlands/Wetlands Mitigation
- Any other Permitting requirements required by the Substation

## **C. APPENDICES**

# Attachment #1: Single Line Diagram for the Physical Interconnection



## Attachment #2: Substation General Arrangement

